Spontaneous diaphragmatic rupture following robotic prostatectomy

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ABSTRACT

Robotic surgery is an established therapy for localised prostate cancer and is replacing conventional laparoscopic prostatectomy in developed countries. Port-site hernia is a recognised, albeit small, risk following laparoscopic or robotic surgery. We report a case of spontaneous rupture of the right hemidiaphragm following robotic prostatectomy.

KEYWORDS

Urology – Robotic – Prostatectomy – Diaphragm – Prostate

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Robotic surgery is an established therapy for localised prostate cancer, and is replacing conventional laparoscopic prostatectomy in developed countries. The number of robot-assisted procedures is rising rapidly, with a more-than 80% increase between 2008/9 and 2009/10 alone.¹ Port site hernia is a recognised, albeit small, risk following laparoscopic or robotic surgery. However, spontaneous rupture of the right hemidiaphragm following robotic prostatectomy has never previously been reported.

Case presentation

A 67-year-old man with a prostate-specific antigen level of 7.8 ng/ml and a Gleason score of 5+4 underwent robotic assisted radical prostatectomy using the da Vinci robotic system (Intuitive Surgical, Sunnyvale, California, USA), alongside lymph node dissection, for prostate carcinoma. There was no extra-prostatic extension or lymph node involvement. His past medical history included bilateral open inguinal hernia repairs and longstanding chronic obstructive pulmonary disease (well controlled with inhalers). There were no intraoperative complications, and he was discharged on postoperative day 3.

He was readmitted later that day with severe abdominal pain and abdominal distension. He was afebrile and his observations were stable. On examination, his abdomen was distended but soft. There was mild guarding on palpation of the right upper quadrant of the abdomen and serosanguinous discharge from his surgical wounds. Bowel sounds were present, with clear urine in the catheter bag. Routine blood tests were unremarkable. Computed tomography (CT) of the thorax, abdomen and pelvis revealed gross colonic distension, faecal loading in the caecum and atelectasis of the right lung base. The patient was admitted and managed

conservatively with a provisional diagnosis of colonic pseudo-obstruction.

Subsequently, the patient developed bilious vomiting with signs of systemic inflammatory response syndrome after 2 days. He was tachycardic with a pulse of 135 beats per minute, pyrexial with a temperature of 38°C and tachypnoeic, at 40 respirations per minute. His oxygen saturation dropped to 92% and his urine output worsened over the course of 3 hours. The drain bag over the port site had an output of 310 ml of serosanguinous fluid. The patient was immediately transferred to the intensive care unit (ITU).

Physical examination revealed absent bowel sounds and reduced air entry, with scattered expiratory wheeze throughout the right lung field. The chest radiograph showed dilated bowel loops in the right hemi-thorax, with right lung collapse and mediastinal shift to the left (Fig 1). A subsequent computed tomography scan confirmed herniation of distended transverse colon into the right hemi-thorax (Fig 2). A diagnosis of right hemidiaphragmatic rupture secondary to large bowel pseudo-obstruction was made and he was taken to theatre promptly.

Upon induction, colonoscopy to decompress the distended colon revealed evidence of mucosal ischaemia within the transverse colon. Surgical access via a rooftop incision demonstrated a strangulated segment of transverse colon, with a large diaphragmatic defect and complete rupture of the right hemi-diaphragm, alongside liver and strangulated transverse colon in the right chest. The diaphragm was noticed to have completely avulsed from its costal attachments. A transverse colectomy with colostomy was performed and the liver was mobilised. The diaphragmatic rupture was repaired with a biological mesh (Permacol; Covidien, Dublin, Ireland) and sutured to the ribs and secured using Pro-Tack (Covidien). An intercostal drain was inserted into the

Figure 1 Chest radiograph showing dilated bowel loops in the right hemithorax, with mediastinal shift to the left

Figure 3 Chest radiograph prior to discharge showing fully expanded right lung and no evidence of reherniation

Figure 2 Computed tomography showing herniation of the liver and colon in the right chest

right hemithorax. A proximal colostomy and distal mucous fistula were fashioned.

The patient was nursed in the ITU and had an uneventful postoperative course. Postoperatively, chest radiograph on removal of the chest drain showed complete resolution (Figure 3). He was discharged 20 days after admission.

Discussion

Diaphragmatic rupture is a rare surgical emergency. The vast majority of cases occur following blunt or penetrating thoraco-abdominal trauma. There are very limited reports of diaphragmatic rupture secondary to intestinal obstruction or pseudo-obstruction.² Early diagnosis is critical, but this is often difficult in delayed and non-traumatic presentations due to the absence of specific clinical signs. In the absence of iatrogenic trauma, timely diagnosis often depends on a high index of suspicion in cases with potential predisposing factors; failure to recognise diaphragmatic rupture is associated with morbidity and mortality of 66%–80%.⁵

We present the first case report of diaphragmatic rupture following robotic prostatectomy, and also the first case report in the English literature of diaphragmatic rupture following pseudo-obstruction.

This case of diaphragmatic rupture was thought to be due to a rise in intra-abdominal pressure as a result of the pseudo-obstruction following robotic prostatectomy. However, cases of right-sided diaphragmatic rupture are less common than left-sided rupture, as the liver acts as a barrier to herniation. Surgeons should consider diaphragmatic rupture in the differential of a post-laparoscopy patient experiencing sudden respiratory distress and/or abdominal pain during hospitalisation, as well as days or months after discharge.

Rapid diagnosis of diaphragmatic rupture via chest x-ray and CT scan and transfer of the patient to an ITU, with early

referral to a specialist upper gastrointestinal/thoracic surgical unit, is crucial to managing this complication. If there is right hemi-diaphragmatic rupture, it is essential to mobilise the liver and expose the ribs and the diaphragm laterally, as well as expose the diaphragm medially. Following careful assessment, the defect can be closed tension-free with a biological mesh and sutured to the ribs laterally and anteriorly, and to the diaphragm medially. In addition to suturing to the ribs, a tacker device can also be used to reinforce the fixation of the mesh to the ribs.

Conclusions

This case highlights the importance of prompt management of postoperative colonic pseudo-obstruction. This may not only decrease complications from pseudo-obstruction but also prevent diaphragmatic rupture.

Conflicts of interest

None

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